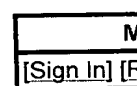
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Details

Display

Abstract

Show

20

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## Pathways followed by protein toxins into cells.

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A number of protein toxins have an enzymatically active part, which is able to modify a cytosolic target. Some of these toxins, for instance ricin, Shiga toxin and cholera toxin, which we will focus on in this article, exert their effect on cells by first binding to the cell surface, then they are endocytosed, and subsequently they are transported retrogradely all the way to the ER before translocation of the enzymatically active part to the cytosol. Thus, studies of these toxins can provide information about pathways of intracellular transport. Retrograde transport to the Golgi and the ER seems to be dependent not only on different Rab and SNARE proteins, but also on cytosolic calcium, phosphatidylinositol 3-kinase and cholesterol. Comparison of the three toxins reveals differences indicating the presence of more than one pathway between early endosomes and the Golgi apparatus or, alternatively, that transport of different toxin-receptor complexes present in a certain subcompartment is differentially regulated.

### Publication Types:

- Review
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